

# Panel Discussion: Exposure, Remediation, and Related Research Needs\*

by Charlotte Witmer†

The panel opened with a request to J. LaVelle (U.S. EPA) to enlarge upon his presentation of a bimodal disposition for the plasma reduction of hexavalent chromium (and subsequent urine concentration) in an occupational group exposed to chromium. He replied that he did not know the size of the population that was exposed, but that the group consisted of workers at a dichromate plant, and the sample size was not very large (1). He added that this distribution does appear to give credence to the theory that there is one reducing agent in plasma that controls the rate of the  $\text{Cr}^{\text{VI}}$  reduction. This is in opposition to the thought that many compounds can participate in this reduction, as opposed to one specific rate-determining reduction reaction. R. Wedeen added that it has been stated that the reduction capacity (for chromium) of plasma is 2 ppm and that the remainder of the hexavalent chromium, above that concentration, enters the erythrocyte, to be reduced there.

R. Hazen (New Jersey Department of Environmental Protection) was then asked what evidence there is of contact dermatitis in the population of Jersey City. To his knowledge this has not been investigated. Evidence of contact dermatitis from chromium comes from occupationally exposed people and the occupationally exposed have not been investigated in Jersey City, nor to his knowledge, has anyone been tested there. LaVelle added that risk assessment is intended to project into the future, to predict results based on certain exposure scenarios, as opposed to being a description of happenings at a specific site. The question was then asked of Hazen whether risk assessments for chromium have been or are being made for the Jersey City location. He answered that a risk assessment has been prepared by a contractor for the Department of Environmental Pro-

tection, and there have also been risk assessments made by his office and these have entered into decisions which the Department has already made about clean-up work, etc. A number has been stated for purposes of remediation of contaminated residential sites.

R. Magee (Hazardous Research Management Center, New Jersey Institute of Technology) was then asked to comment on how the information presented at this meeting would be helpful to him in decision-making processes for chromium waste sites. He replied that he had learned a lot about chromium, but that in regard to remediation he feels in the middle of several problems as he must make decisions choosing from several remediation processes, many times without sufficient information. He added that he also has to make decisions about funding research projects to develop remediation processes, and he feels that he does not always get the complete picture. In summary, how to choose the best method of remediation is still difficult. Choices available include isolation of a site (e.g., covering over with asphalt), *in situ* treatment, as well as the "remove and treat" process. Since each of these major categories of treatment involves different levels of exposure to different groups of people, such as the immediate community and the workers in general, he feels that better communication between the risk assessment groups and those who are investigating new technologies is extremely important. He needs to know the risk associated with each technology for each specific situation. Required knowledge includes the risk for and numbers of the populace to be exposed in the removal process as opposed to the numbers which will be exposed by *in situ* technology, etc. He added that he may also consider the possibility that he must avoid all exposure and that engineers should be challenged to develop some techniques that do not involve movement of hazardous material but involve treatment *in situ*. He feels that there is a possibility that these important questions may be ignored, and it is important that they should not be. He emphasized the problems of making decisions that will minimize risk to the public. This problem needs to be added into the equations of research. Too often the

\*Moderator: Charlotte Witmer. Panelists: Ron Corcoran, Robert Hazen, James LaVelle, Paul Liroy, Richard Magee, and Tom McKee. Participants from audience: Saul Shupack, Richmond Bartlett, Bernard Goldstein, Richard Wedeen, and Michael Gochfeld.

†Joint Graduate Program in Toxicology, Rutgers University, Piscataway, NJ 08855.

remedy is temporary, with removal of the toxic material to a different site. R. Bartlett added that the economics of the processes must be considered. Magee added that caveats should always be given to the decision makers. R. Corcoran (New Jersey Department of Environmental Protection) added that there is no *in situ* type of treatment that does not involve monitoring, inspections, land use restrictions, etc., and that excavation with an exposure component takes into consideration the dusts and other types of exposure, as do all types of treatment. Magee pointed out that knowledge of the toxicity should be accompanied by guidance for the remediator. He felt that all remediators need help.

B. Goldstein then added that you cannot do risk assessment without data, and then this must be projected into all sorts of areas. He added that it is also important to gather as much data from a real situation as possible to help in future risk assessments. He asked whether there are any actual studies about sensitization being carried out in Jersey City and whether there is risk assessment now done for those involved in the various remediation processes. He also emphasized that there is a trend now to calculate the actual problems encountered in the remediation processes. P. Liroy (Rutgers University) pointed out that in several remediation processes in New Jersey (e.g., at sites of the waterfront restorations) there has been the requirement that there is a monitoring of the neighboring populace and of the workers. The panel agreed that there are possibilities that the remediation processes may create a greater hazard to both the workers and the community than does the toxic material at the original sites. Magee agreed that these industrial processes may often be more dangerous than realized, although this was argued. Magee said that he may not be able to meet the standards required by one clean-up method, while the other alternate method may ultimately generate a cleaner site, but the intermediate hazard may be greater. He emphasized that he does not like to move things around and said it would be ideal if we could come up with methods for clean-up which avoid this process. These problems face him, and he sees no help in these decisions from research at present. Corcoran felt that there has been careful monitoring of the impact of the remedial processes, particularly recently. Magee reemphasized that we must avoid looking at only the final

result and should be very conscious of the exposure levels during the clean-up processes.

In defense of the excavation processes, T. McKee (New Jersey Department of Environmental Protection) pointed out that only for small residential lots (100 × 120 lots) was this process recommended because other processes were not practical. Magee again raised the issue that for small sites such innovative treatments as exposure to infrared temperatures, etc., might be ideal.

In regard to factors to be taken into consideration in remediation decisions, S. Shupack noted that reclaiming chromium should be cost effective. McKee explained that the decision to excavate was for small residential areas where no other process, such as reclaiming very small amounts of chromium, was practical. Magee further explained that frequently moving things around rather than covering it over often involves more risk than is apparent, and it is better to address the more difficult problem of treating in place. There are some new technologies such as infrared heating which may solve some of these problems. He emphasized that the problem sometimes can be better solved at its source. Magee said he only wanted to raise the issue that the risk of the treatment process itself is something we cannot ignore. It is very expensive to take adequate precautions for all of the remedial workers. But, on the Federal level, all processes have a risk assessment and cost assessment carried out before decisions are made about the remedial processes to be used. Environmental impact studies are always carried out. It was also noted that when the Federal government is involved, the health of the workers is of primary consideration. There is also the important problem of litigation from workers.

M. Gochfeld then emphasized that the field of environmental health is one which involves risk/risk trade-offs which must play a role in environmental health concerns. He added that the meeting has raised many questions.

## REFERENCE

1. Korallus, U. Biological activity of chromium(VI) against chromium(III) compounds: new aspects of biological monitoring. In: Chromium Symposium, 1986, An Update (D. M. Serrone, Ed.), Industrial Health Foundation, Pittsburgh, PA 1986, pp. 210-230.